SEQUENCE LISTING

<110> ImmunoGen, Inc.

<120> ANTI-IGF-I RECEPTOR ANTIBODY

<130> A8689

<140> 10/729,441
<141> 2003-12-08

<150> 10/170,390
<151> 2002-06-14

<160> 96

<170> PatentIn version 3.2

<210> 1
<211> 5
<212> PRT
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<220>
<223> antibody heavy chain complementarity determining region

<400> 1

Ser Tyr Trp Met His
1 5

<210> 2
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<220>
<223> antibody heavy chain complementarity determining region

<400> 2

Glu Ile Asn Pro Ser Asn Gly Arg Thr Asn Tyr Asn Glu Lys Phe Lys
1 5 10 15

Arg

<210> 3
<211> 15
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<220>

<223> antibody heavy chain complementarity determining region

<400> 3

Gly Arg Pro Asp Tyr Tyr Gly Ser Ser Lys Trp Tyr Phe Asp Val
1 5 10 15

<210> 4
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<220>
<223> antibody light chain complementarity determining region

<400> 4

Arg Ser Ser Gln Ser Ile Val His Ser Asn Val Asn Thr Tyr Leu Glu
1 5 10 15

<210> 5
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<220>
<223> antibody light chain complementarity determining region

<400> 5

Lys Val Ser Asn Arg Phe Ser
1 5

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<213> Artificial Sequence

<220>
<223> antibody light chain complementarity determining region

<400> 6

Phe Gln Gly Ser His Val Pro Pro Thr
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<210> 7
<211> 124
<212> PRT
<213> Artificial Sequence

<220>

<223> antibody heavy chain

<400> 7

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Gln Val Gln Leu Gln Gln Ser Gly Ala Glu Leu Val Lys Pro Gly Ala
1               5                   10                  15

Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Ser Tyr
            20                  25                  30

Trp Met His Trp Val Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile
        35                  40                  45

Gly Glu Ile Asn Pro Ser Asn Gly Arg Thr Asn Tyr Asn Glu Lys Phe
    50                  55                  60

Lys Arg Lys Ala Thr Leu Thr Val Asp Lys Ser Ser Ser Thr Ala Tyr
65                  70                  75                  80

Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Phe
                85                  90                  95

Ala Arg Gly Arg Pro Asp Tyr Tyr Gly Ser Ser Lys Trp Tyr Phe Asp
            100                 105                 110

Val Trp Gly Ala Gly Thr Thr Val Thr Val Ser Ser
        115                 120
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<210> 8
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> antibody light chain

<400> 8

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Asp Val Leu Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1               5                   10                  15

Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val His Ser
            20                  25                  30

Asn Val Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
        35                  40                  45
```

```
Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
    50                  55                  60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Arg Ile
65                  70                  75                  80

Ser Arg Val Glu Ala Glu Asp Leu Gly Ile Tyr Tyr Cys Phe Gln Gly
                85                  90                  95

Ser His Val Pro Pro Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
            100                 105                 110

Arg
```

<210> 9
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized light chain variable region

<400> 9

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Asp Val Val Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1               5                   10                  15

Asp Pro Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val His Ser
            20                  25                  30

Asn Val Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
        35                  40                  45

Pro Arg Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
    50                  55                  60

Asp Arg Phe Ser Gly Ser Gly Ala Gly Thr Asp Phe Thr Leu Arg Ile
65                  70                  75                  80

Ser Arg Val Glu Ala Glu Asp Leu Gly Ile Tyr Tyr Cys Phe Gln Gly
                85                  90                  95
```

Ser His Val Pro Pro Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105 110

Arg

<210> 10
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized light chain variable region

<400> 10

Asp Val Leu Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Pro Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val His Ser
20 25 30

Asn Val Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ala Gly Thr Asp Phe Thr Leu Arg Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Leu Gly Ile Tyr Tyr Cys Phe Gln Gly
85 90 95

Ser His Val Pro Pro Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105 110

Arg

<210> 11
<211> 113
<212> PRT
<213> Artificial Sequence

<220>

<223> humanized light chain variable region

<400> 11

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Asp Val Leu Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1               5                  10                  15

Asp Pro Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val His Ser
            20                  25                  30

Asn Val Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
        35                  40                  45

Pro Arg Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
    50                  55                  60

Asp Arg Phe Ser Gly Ser Gly Ala Gly Thr Asp Phe Thr Leu Arg Ile
65                  70                  75                  80

Ser Arg Val Glu Ala Glu Asp Leu Gly Ile Tyr Tyr Cys Phe Gln Gly
                85                  90                  95

Ser His Val Pro Pro Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
            100                 105                 110

Arg
```

<210> 12
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized light chain variable region

<400> 12

```
Asp Val Val Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1               5                  10                  15

Asp Pro Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val His Ser
            20                  25                  30

Asn Val Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
        35                  40                  45
```

```
Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
    50                  55                  60

Asp Arg Phe Ser Gly Ser Gly Ala Gly Thr Asp Phe Thr Leu Arg Ile
65                  70                  75                  80

Ser Arg Val Glu Ala Glu Asp Leu Gly Ile Tyr Tyr Cys Phe Gln Gly
                85                  90                  95

Ser His Val Pro Pro Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
            100                 105                 110

Arg
```

<210> 13
<211> 124
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized heavy chain variable region

<400> 13

```
Gln Val Gln Leu Val Gln Ser Gly Ala Glu Val Val Lys Pro Gly Ala
1               5                   10                  15

Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Ser Tyr
            20                  25                  30

Trp Met His Trp Val Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile
        35                  40                  45

Gly Glu Ile Asn Pro Ser Asn Gly Arg Thr Asn Tyr Asn Gln Lys Phe
    50                  55                  60

Gln Gly Lys Ala Thr Leu Thr Val Asp Lys Ser Ser Ser Thr Ala Tyr
65                  70                  75                  80

Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Phe
                85                  90                  95
```

Ala Arg Gly Arg Pro Asp Tyr Tyr Gly Ser Ser Lys Trp Tyr Phe Asp
100 105 110

Val Trp Gly Gln Gly Thr Thr Val Thr Val Ser Ser
115 120

<210> 14
<211> 46
<212> DNA
<213> Artificial Sequence

<220>
<223> degenerate 3' light chain PCR primer - HindKL

<400> 14
tatagagctc aagcttggat ggtgggaaga tggatacagt tggtgc 46

<210> 15
<211> 36
<212> DNA
<213> Artificial Sequence

<220>
<223> degenerate 3' heavy chain PCR primer- Bgl2IgG1

<400> 15
ggaagatcta tagacagatg ggggtgtcgt tttggc 36

<210> 16
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> poly C 5' PCR primer - EcoPolyC

<400> 16
tatatctaga attcccccccc cccccccccc 30

<210> 17
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> degenerate 5' light chain PCR primer - SacIMK

<400> 17
gggagctcga yattgtgmts acmcarwctm ca 32

<210> 18
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> degenerate 5' heavy chain PCR primer - EcoR1MH1

<220>
<221> misc_feature
<222> (18)..(18)
<223> "n" may be any nucleic acid

<400> 18
cttccggaat tcsargtnma gctgsagsag tc 32

<210> 19
<211> 35
<212> DNA
<213> Artificial Sequence

<220>
<223> degenerate 5' heavy chain PCR primer - EcoR1MH2

<220>
<221> misc_feature
<222> (18)..(18)
<223> "n" may be any nucleotide

<400> 19
cttccggaat tcsargtnma gctgsagsag tcwgg 35

<210> 20
<211> 10
<212> PRT
<213> Mus musculus

<400> 20

Asp Val Leu Met Thr Gln Thr Pro Leu Ser
1 5 10

<210> 21
<211> 10
<212> PRT
<213> Mus musculus

<400> 21

Gly Arg Pro Asp Tyr Tyr Gly Ser Ser Lys
1 5 10

<210> 22
<211> 24
<212> PRT
<213> Mus musculus

<400> 22

Ser Ser Ser Thr Ala Tyr Met Gln Leu Ser Ser Leu Thr Ser Glu Asp
1 5 10 15

Ser Ala Val Tyr Tyr Phe Ala Arg
20

<210> 23
<211> 57
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR primer

<400> 23
caggtgtaca ctcccaggtc caactggtgc agtctggggc tgaagtggtg aagcctg 57

<210> 24
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR primer

<400> 24
caatcagaag ttccagggga aggccacac 29

<210> 25
<211> 34
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR primer

<400> 25
ccttcccctg gaacttctga ttgtagttag tacg 34

<210> 26
<211> 37
<212> DNA

<213> Artificial Sequence

<220>
<223> PCR primer

<400> 26
caggtgtaca ctccgatgtt gtgatgaccc aaactcc 37

<210> 27
<211> 37
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR primer

<400> 27
caggtgtaca ctccgatgtt ttgatgaccc aaactcc 37

<210> 28
<211> 39
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR primer

<400> 28
gactagatct gcaagagatg gaggctggat ctccaagac 39

<210> 29
<211> 35
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR primer

<400> 29
ttgcagatct agtcagagca tagtacatag taatg 35

<210> 30
<211> 48
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR primer

<400> 30
gaatggtacc tgcagaaacc aggccagtct ccaaggctcc tgatctac 48

<210> 31
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR primer

<400> 31
gtggcagtgg agcagggaca gatttcac 28

<210> 32
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR primer

<400> 32
gaaatctgtc cctgctccac tgccactg 28

<210> 33
<211> 19
<212> PRT
<213> Homo sapiens

<400> 33

Asp Leu Thr Leu Leu Gln Pro Gly Gln Lys Gly Asp Ser Arg Glu Lys
1 5 10 15

Lys Arg Ala

<210> 34
<211> 18
<212> PRT
<213> Homo sapiens

<400> 34

Asp Val Thr Leu Leu Pro Pro Gly Gln Arg Gly Asp Ala Arg Glu Lys
1 5 10 15

Lys Arg

<210> 35

<211> 19
<212> PRT
<213> Homo sapiens

<400> 35

Asp Gln Ser Leu Ile Pro Pro Gly Gln Lys Gly Asp Ser Arg Asp Lys
1 5 10 15

Lys Arg Ala

<210> 36
<211> 18
<212> PRT
<213> Homo sapiens

<400> 36

Asp Met Ser Ser Val Arg Pro Gly Gln Lys Gly Ser Ser Ser Asp Lys
1 5 10 15

Lys Arg

<210> 37
<211> 18
<212> PRT
<213> Homo sapiens

<400> 37

Glu Val Ser Gly Pro Arg Pro Gly Gln Arg Gly Asp Ser Arg Glu Lys
1 5 10 15

Lys Arg

<210> 38
<211> 18
<212> PRT
<213> Homo sapiens

<400> 38

Glu Val Ser Gly Pro Arg Pro Gly Gln Arg Gly Asp Ser Arg Glu Lys
1 5 10 15

Lys Arg

<210> 39
<211> 25
<212> PRT
<213> Homo sapiens

<400> 39

Gln Gln Gln Ala Leu Lys Pro Gly Lys Lys Thr Pro Gly Gln Glu Lys
1 5 10 15

Lys Arg Lys Ser Ser Ser Glu Ala Ser
20 25

<210> 40
<211> 25
<212> PRT
<213> Homo sapiens

<400> 40

Gln Gln Val Ala Val Lys Pro Gly Lys Lys Thr Pro Gly Gln Gln Lys
1 5 10 15

Gln Gly Lys Ser Ser Ser Glu Gln Ser
20 25

<210> 41
<211> 25
<212> PRT
<213> Homo sapiens

<400> 41

Gln Gln Gln Pro Leu Lys Pro Gly Lys Lys Thr Pro Gly Lys Asp Asp
1 5 10 15

Lys Gly Thr Ser Asn Asn Glu Gln Ser
20 25

<210> 42
<211> 25
<212> PRT
<213> Homo sapiens

<400> 42

Gln Gln Val Ala Val Lys Pro Gly Lys Lys Thr Pro Gly Gln Gln Lys

1 5 10 15

Lys Gly Lys Ser Ser Ser Glu Gln Ser
20 25

<210> 43
<211> 24
<212> PRT
<213> Homo sapiens

<400> 43

Gln Val Ala Val Lys Pro Gly Lys Lys Thr Pro Gly Gln Gln Lys Gln
1 5 10 15

Gly Lys Ser Ser Ser Glu Gln Ser
20

<210> 44
<211> 24
<212> PRT
<213> Homo sapiens

<400> 44

Gln Val Ala Val Lys Pro Gly Lys Lys Thr Pro Gly Gln Gln Lys Gln
1 5 10 15

Gly Glu Ser Ser Ser Glu Gln Ser
20

<210> 45
<211> 40
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR primer

<400> 45
ttttgagctc ttatttacca ggagagtggg agaggctctt 40

<210> 46
<211> 37
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR primer

<400> 46
ttttaagctt gccaaaacga cacccccatc tgtctat 37

<210> 47
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR primer

<400> 47
ttttggatcc taacactcat tcctgttgaa gc 32

<210> 48
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR primer

<400> 48
ttttgaattc gggctgatgc tgcaccaact g 31

<210> 49
<211> 396
<212> DNA
<213> Mus musculus

<220>
<221> CDS
<222> (1)..(396)

<400> 49
atg aag ttg cct gtt agg ctg ttg gtg ctg atg ttc tgg att cct gct 48
Met Lys Leu Pro Val Arg Leu Leu Val Leu Met Phe Trp Ile Pro Ala
1 5 10 15

tcc agt agt gat gtt ttg atg acc caa act cca ctc tcc ctg cct gtc 96
Ser Ser Ser Asp Val Leu Met Thr Gln Thr Pro Leu Ser Leu Pro Val
20 25 30

agt ctt gga gat caa gcc tcc atc tct tgc aga tct agt cag agc att 144
Ser Leu Gly Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile
35 40 45

gta cat agt aat gta aac acc tat tta gaa tgg tac ctg cag aaa cca 192
Val His Ser Asn Val Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro
50 55 60

```
ggc cag tct cca aag ctc ctg atc tac aaa gtt tcc aac cga ttt tct      240
Gly Gln Ser Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser
65                  70                  75                  80

ggg gtc cca gac agg ttc agt ggc agt gga tca ggg aca gat ttc aca      288
Gly Val Pro Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr
                85                  90                  95

ctc agg atc agc aga gtg gag gct gag gat ctg gga att tat tac tgc      336
Leu Arg Ile Ser Arg Val Glu Ala Glu Asp Leu Gly Ile Tyr Tyr Cys
            100                 105                 110

ttt caa ggt tca cat gtt cct ccg acg ttc ggt gga ggc acc aag ctg      384
Phe Gln Gly Ser His Val Pro Pro Thr Phe Gly Gly Gly Thr Lys Leu
        115                 120                 125

gaa atc aaa cgg                                                     396
Glu Ile Lys Arg
    130
```

<210> 50
<211> 132
<212> PRT
<213> Mus musculus

<400> 50

```
Met Lys Leu Pro Val Arg Leu Leu Val Leu Met Phe Trp Ile Pro Ala
1               5                   10                  15

Ser Ser Ser Asp Val Leu Met Thr Gln Thr Pro Leu Ser Leu Pro Val
            20                  25                  30

Ser Leu Gly Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile
        35                  40                  45

Val His Ser Asn Val Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro
    50                  55                  60

Gly Gln Ser Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser
65                  70                  75                  80

Gly Val Pro Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr
                85                  90                  95

Leu Arg Ile Ser Arg Val Glu Ala Glu Asp Leu Gly Ile Tyr Tyr Cys
            100                 105                 110
```

```
Phe Gln Gly Ser His Val Pro Pro Thr Phe Gly Gly Gly Thr Lys Leu
        115                 120                 125

Glu Ile Lys Arg
    130
```

<210> 51
<211> 429
<212> DNA
<213> Mus musculus

<220>
<221> CDS
<222> (1)..(429)

<400> 51

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atg gga tgg agc tat atc atc ctc ttt ttg gta gca aca gct aca gaa       48
Met Gly Trp Ser Tyr Ile Ile Leu Phe Leu Val Ala Thr Ala Thr Glu
1               5                   10                  15

gtc cac tcc cag gtc caa ctg cag cag tct ggg gct gaa ctg gtg aag       96
Val His Ser Gln Val Gln Leu Gln Gln Ser Gly Ala Glu Leu Val Lys
            20                  25                  30

cct ggg gct tca gtg aag ctg tcc tgt aag gct tct ggc tac acc ttc      144
Pro Gly Ala Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Thr Phe
        35                  40                  45

acc agc tac tgg atg cac tgg gtg aag cag agg cct gga caa ggc ctt      192
Thr Ser Tyr Trp Met His Trp Val Lys Gln Arg Pro Gly Gln Gly Leu
    50                  55                  60

gag tgg att gga gag att aat cct agc aac ggt cgt act aac tac aat      240
Glu Trp Ile Gly Glu Ile Asn Pro Ser Asn Gly Arg Thr Asn Tyr Asn
65                  70                  75                  80

gag aag ttc aag agg aag gcc aca ctg act gta gac aaa tcc tcc agc      288
Glu Lys Phe Lys Arg Lys Ala Thr Leu Thr Val Asp Lys Ser Ser Ser
                85                  90                  95

aca gcc tac atg caa ctc agc agc ctg aca tct gag gac tct gcg gtc      336
Thr Ala Tyr Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val
            100                 105                 110

tat tac ttt gca aga gga aga cca gat tac tac ggt agt agc aag tgg      384
Tyr Tyr Phe Ala Arg Gly Arg Pro Asp Tyr Tyr Gly Ser Ser Lys Trp
        115                 120                 125

tac ttc gat gtc tgg ggc gca ggg acc acg gtc acc gtc tcc tca          429
Tyr Phe Asp Val Trp Gly Ala Gly Thr Thr Val Thr Val Ser Ser
    130                 135                 140
```

<210> 52
<211> 143
<212> PRT
<213> Mus musculus

<400> 52

Met Gly Trp Ser Tyr Ile Ile Leu Phe Leu Val Ala Thr Ala Thr Glu
1 5 10 15

Val His Ser Gln Val Gln Leu Gln Gln Ser Gly Ala Glu Leu Val Lys
20 25 30

Pro Gly Ala Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Thr Phe
35 40 45

Thr Ser Tyr Trp Met His Trp Val Lys Gln Arg Pro Gly Gln Gly Leu
50 55 60

Glu Trp Ile Gly Glu Ile Asn Pro Ser Asn Gly Arg Thr Asn Tyr Asn
65 70 75 80

Glu Lys Phe Lys Arg Lys Ala Thr Leu Thr Val Asp Lys Ser Ser Ser
85 90 95

Thr Ala Tyr Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val
100 105 110

Tyr Tyr Phe Ala Arg Gly Arg Pro Asp Tyr Tyr Gly Ser Ser Lys Trp
115 120 125

Tyr Phe Asp Val Trp Gly Ala Gly Thr Thr Val Thr Val Ser Ser
130 135 140

<210> 53
<211> 10
<212> PRT
<213> Mus musculus

<400> 53

Gly Tyr Thr Phe Thr Ser Tyr Trp Met His
1 5 10

<210> 54
<211> 10

<212> PRT
<213> Mus musculus

<400> 54

Glu Ile Asn Pro Ser Asn Gly Arg Thr Asn
1 5 10

<210> 55
<211> 15
<212> PRT
<213> Mus musculus

<400> 55

Gly Arg Pro Asp Tyr Tyr Gly Ser Ser Lys Trp Tyr Phe Asp Val
1 5 10 15

<210> 56
<211> 100
<212> PRT
<213> Mus musculus

<400> 56

Asp Val Leu Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val His Ser
20 25 30

Asn Gly Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Tyr Cys Phe Gln Gly
85 90 95

Ser His Val Pro
100

<210> 57

<211> 98
<212> PRT
<213> Mus musculus

<400> 57

Gln Val Gln Leu Gln Gln Pro Gly Ala Glu Leu Val Lys Pro Gly Ala
1 5 10 15

Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Ser Tyr
20 25 30

Trp Met His Trp Val Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile
35 40 45

Gly Glu Ile Asn Pro Ser Asn Gly Arg Thr Asn Tyr Asn Glu Lys Phe
50 55 60

Lys Ser Lys Ala Thr Leu Thr Val Asp Lys Ser Ser Ser Thr Ala Tyr
65 70 75 80

Met Gln Leu Ser Ser Pro Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys
85 90 95

Ala Arg

<210> 58
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<400> 58

Asp Val Leu Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val His Ser
20 25 30

Asn Val Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Arg Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Leu Gly Ile Tyr Tyr Cys Phe Gln Gly
85 90 95

Ser His Val Pro Pro Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105 110

Arg

<210> 59
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<400> 59

Asp Val Leu Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val His Ser
20 25 30

Asn Gly Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Lys Leu Leu Ile Tyr Ser Ile Ser Ser Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

Ser Arg Val Gln Ala Glu Asp Leu Gly Val Tyr Tyr Cys Phe Gln Gly
85 90 95

Ser His Val Pro Tyr Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105 110

Arg

<210> 60
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<400> 60

Asp Val Leu Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Thr Ile Val His Ser
20 25 30

Asn Gly Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Lys Leu Leu Ile Tyr Lys Val Thr Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Tyr Cys Phe Gln Gly
85 90 95

Thr His Ala Pro Tyr Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105 110

Arg

<210> 61
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<400> 61

Asp Ile Glu Leu Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val His Ser
20 25 30

Asn Gly Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Tyr Cys Phe Gln Gly
85 90 95

Ser His Val Pro Tyr Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105 110

Arg

<210> 62
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<400> 62

Asp Val Leu Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Gln Ala Ser Ile Ser Cys Arg Phe Ser Gln Ser Ile Val His Ser
20 25 30

Asn Gly Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Ser Gly Gln Ser
35 40 45

Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Tyr Cys Phe Gln Gly
85 90 95

Ser His Val Pro Arg Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105 110

Arg

<210> 63
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<400> 63

Glu Leu Val Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Thr Ile Val His Ser
20 25 30

Asn Gly Asp Thr Tyr Leu Asp Trp Phe Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Tyr Cys Phe Gln Gly
85 90 95

Ser His Val Pro Pro Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105 110

Arg

<210> 64
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<400> 64

```
Asp Val Leu Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1               5                   10                  15

Asp Gln Ala Ser Ile Ser Cys Arg Ser Asn Gln Thr Ile Leu Leu Ser
            20                  25                  30

Asp Gly Asp Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
        35                  40                  45

Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
    50                  55                  60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65                  70                  75                  80

Ser Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Tyr Cys Phe Gln Gly
                85                  90                  95

Ser His Val Pro Pro Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
            100                 105                 110
```

Arg

<210> 65
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<400> 65

Asp Val Leu Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Gln Ala Ser Ile Ser Cys Lys Ser Ser Gln Ser Ile Val His Ser
20 25 30

Ser Gly Asn Thr Tyr Phe Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Tyr Cys Phe Gln Gly
85 90 95

Ser His Ile Pro Phe Thr Phe Gly Ser Gly Thr Lys Leu Glu Ile Lys
100 105 110

Arg

<210> 66
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<400> 66

Asp Val Leu Met Thr Gln Ile Pro Val Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Ile Ile Val His Asn
20 25 30

Asn Gly Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Gln Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Tyr Cys Phe Gln Gly
85 90 95

Ser His Val Pro Phe Thr Phe Gly Ser Gly Thr Lys Leu Glu Ile Lys
100 105 110

Arg

<210> 67
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<400> 67

Asp Val Leu Met Thr Gln Thr Pro Val Ser Leu Ser Val Ser Leu Gly
1 5 10 15

Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val His Ser
20 25 30

Thr Gly Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Lys Leu Leu Ile Tyr Lys Ile Ser Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Tyr Cys Phe Gln Ala
85 90 95

Ser His Ala Pro Arg Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105 110

Arg

<210> 68
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<400> 68

Asp Val Leu Met Thr Gln Ile Pro Val Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Ile Ile Val His Asn
20 25 30

Asn Gly Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Gln Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Tyr Cys Phe Gln Gly
85 90 95

Ser His Val Pro Phe Thr Phe Gly Ser Gly Thr Lys Leu Glu Ile Lys
100 105 110

Arg

<210> 69
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<220>
<221> MISC_FEATURE
<222> (28)..(28)
<223> "X" may be any amino acid

<220>
<221> MISC_FEATURE
<222> (101)..(101)
<223> "X" may be any amino acid

<400> 69

Asp Val Leu Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Xaa Ile Val His Ser
20 25 30

Asn Gly Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Tyr Cys Phe Gln Gly
85 90 95

Ser His Val Pro Xaa Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105 110

Arg

<210> 70
<211> 124
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<400> 70

Gln Val Gln Leu Gln Gln Ser Gly Ala Glu Leu Val Lys Pro Gly Ala

```
1               5                   10                  15

Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Ser Tyr
            20                  25                  30

Trp Met His Trp Val Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile
        35                  40                  45

Gly Glu Ile Asn Pro Ser Asn Gly Arg Thr Asn Tyr Asn Glu Lys Phe
    50                  55                  60

Lys Arg Lys Ala Thr Leu Thr Val Asp Lys Ser Ser Ser Thr Ala Tyr
65                  70                  75                  80

Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Phe
                85                  90                  95

Ala Arg Gly Arg Pro Asp Tyr Tyr Gly Ser Ser Lys Trp Tyr Phe Asp
            100                 105                 110

Val Trp Gly Ala Gly Thr Thr Val Thr Val Ser Ser
        115                 120
```

<210> 71
<211> 120
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<400> 71

```
Gln Val Gln Leu Gln Gln Ser Gly Ala Glu Leu Val Lys Pro Gly Ala
1               5                   10                  15

Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Ser Tyr
            20                  25                  30

Trp Met His Trp Val Lys Gln Arg Pro Gly Arg Gly Leu Glu Trp Ile
        35                  40                  45

Gly Arg Ile Asp Pro Asn Ser Gly Gly Thr Lys Tyr Asn Glu Lys Phe
    50                  55                  60
```

```
Lys Ser Lys Ala Thr Leu Thr Val Asp Lys Pro Ser Ser Thr Ala Tyr
65                  70                  75                  80

Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys
                85                  90                  95

Ala Arg Tyr Asp Tyr Tyr Gly Ser Ser Tyr Phe Asp Tyr Trp Gly Gln
            100                 105                 110

Gly Thr Thr Val Thr Val Ser Ser
        115                 120
```

<210> 72
<211> 120
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<400> 72

```
Gln Val Gln Leu Gln Gln Pro Gly Ala Glu Leu Val Lys Pro Gly Ala
1               5                   10                  15

Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Ser Tyr
            20                  25                  30

Trp Met His Trp Val Lys Gln Arg Pro Gly Arg Gly Leu Glu Trp Ile
        35                  40                  45

Gly Arg Ile Asp Pro Asn Ser Gly Gly Thr Lys Tyr Asn Glu Lys Phe
    50                  55                  60

Lys Ser Lys Ala Thr Leu Thr Val Asp Lys Pro Ser Ser Thr Ala Tyr
65                  70                  75                  80

Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys
                85                  90                  95

Ala Arg Tyr Asp Tyr Tyr Gly Ser Ser Tyr Phe Asp Tyr Trp Gly Gln
            100                 105                 110

Gly Thr Thr Leu Thr Val Ser Ser
```

115 120

<210> 73
<211> 122
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<400> 73

Gln Val Gln Leu Gln Gln Pro Gly Ala Glu Leu Val Lys Pro Gly Ala
1 5 10 15

Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Ser Tyr
20 25 30

Trp Met His Trp Val Lys Gln Gly Pro Gly Gln Gly Leu Glu Trp Ile
35 40 45

Gly Glu Ile Asp Pro Ser Asp Ser Tyr Pro Asn Tyr Asn Glu Lys Phe
50 55 60

Lys Gly Lys Ala Thr Leu Thr Val Asp Lys Ser Ser Ser Thr Ala Tyr
65 70 75 80

Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys
85 90 95

Ala Ser Leu Tyr Tyr Tyr Gly Thr Ser Tyr Gly Val Leu Asp Tyr Trp
100 105 110

Gly Gln Gly Thr Ser Val Thr Val Ser Ser
115 120

<210> 74
<211> 120
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<400> 74

Gln Val Gln Leu Gln Gln Pro Gly Ser Val Leu Val Arg Pro Gly Ala

```
1               5                   10                  15

Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Ser Ser
            20                  25                  30

Trp Ile His Trp Ala Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile
        35                  40                  45

Gly Glu Ile His Pro Asn Ser Gly Asn Thr Asn Tyr Asn Glu Lys Phe
    50                  55                  60

Lys Gly Lys Ala Thr Leu Thr Val Asp Thr Ser Ser Ser Thr Ala Tyr
65                  70                  75                  80

Val Asp Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys
                85                  90                  95

Ala Arg Trp Arg Tyr Gly Ser Pro Tyr Tyr Phe Asp Tyr Trp Gly Gln
            100                 105                 110

Gly Thr Thr Leu Thr Val Ser Ser
        115                 120
```

<210> 75
<211> 118
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<400> 75

```
Gln Val Gln Phe Gln Gln Ser Gly Ala Glu Leu Val Lys Pro Gly Ala
1               5                   10                  15

Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Ser Tyr
            20                  25                  30

Leu Met His Trp Ile Lys Gln Arg Pro Gly Arg Gly Leu Glu Trp Ile
        35                  40                  45

Gly Arg Ile Asp Pro Asn Asn Val Val Thr Lys Phe Asn Glu Lys Phe
    50                  55                  60
```

```
Lys Ser Lys Ala Thr Leu Thr Val Asp Lys Pro Ser Ser Thr Ala Tyr
65                  70                  75                  80

Met Glu Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys
                85                  90                  95

Ala Arg Tyr Ala Tyr Cys Arg Pro Met Asp Tyr Trp Gly Gln Gly Thr
            100                 105                 110

Thr Val Thr Val Ser Ser
        115
```

<210> 76
<211> 117
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<400> 76

```
Gln Ile Gln Leu Gln Gln Ser Gly Pro Glu Leu Val Arg Pro Gly Ala
1               5                   10                  15

Ser Val Lys Ile Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Asp Tyr
            20                  25                  30

Tyr Ile His Trp Val Lys Gln Arg Pro Gly Glu Gly Leu Glu Trp Ile
        35                  40                  45

Gly Trp Ile Tyr Pro Gly Ser Gly Asn Thr Lys Tyr Asn Glu Lys Phe
    50                  55                  60

Lys Gly Lys Ala Thr Leu Thr Val Asp Thr Ser Ser Ser Thr Ala Tyr
65                  70                  75                  80

Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Phe Cys
                85                  90                  95

Ala Arg Gly Gly Lys Phe Ala Met Asp Tyr Trp Gly Gln Gly Thr Ser
            100                 105                 110

Val Thr Val Ser Ser
```

115

<210> 77
<211> 120
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<400> 77

Gln Val Gln Leu Gln Gln Ser Gly Ala Glu Leu Met Lys Pro Gly Ala
1 5 10 15

Ser Val Lys Ile Ser Cys Lys Ala Thr Gly Tyr Thr Phe Ser Ser Phe
20 25 30

Trp Ile Glu Trp Val Lys Gln Arg Pro Gly His Gly Leu Glu Trp Ile
35 40 45

Gly Glu Ile Leu Pro Gly Ser Gly Gly Thr His Tyr Asn Glu Lys Phe
50 55 60

Lys Gly Lys Ala Thr Phe Thr Ala Asp Lys Ser Ser Asn Thr Ala Tyr
65 70 75 80

Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys
85 90 95

Ala Arg Gly His Ser Tyr Tyr Phe Tyr Asp Gly Asp Tyr Trp Gly Gln
100 105 110

Gly Thr Ser Val Thr Val Ser Ser
115 120

<210> 78
<211> 120
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<400> 78

Gln Ile Gln Leu Gln Gln Ser Gly Pro Glu Leu Val Lys Pro Gly Ala

1 5 10 15

Ser Val Lys Ile Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Asp Tyr
20 25 30

Tyr Ile Asn Trp Met Lys Gln Lys Pro Gly Gln Gly Leu Glu Trp Ile
35 40 45

Gly Trp Ile Asp Pro Gly Ser Gly Asn Thr Lys Tyr Asn Glu Lys Phe
50 55 60

Lys Gly Lys Ala Thr Leu Thr Val Asp Thr Ser Ser Ser Thr Ala Tyr
65 70 75 80

Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Thr Ala Val Tyr Phe Cys
85 90 95

Ala Arg Glu Lys Thr Thr Tyr Tyr Tyr Ala Met Asp Tyr Trp Gly Gln
100 105 110

Gly Thr Ser Val Thr Val Ser Ala
115 120

<210> 79
<211> 120
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<400> 79

Gln Val Gln Leu Leu Glu Ser Gly Ala Glu Leu Met Lys Pro Gly Ala
1 5 10 15

Ser Val Lys Ile Ser Cys Lys Ala Thr Gly Tyr Thr Phe Ser Ser Phe
20 25 30

Trp Ile Glu Trp Val Lys Gln Arg Pro Gly His Gly Leu Glu Trp Ile
35 40 45

Gly Glu Ile Leu Pro Gly Ser Gly Gly Thr His Tyr Asn Glu Lys Phe
50 55 60

```
Lys Gly Lys Ala Thr Phe Thr Ala Asp Lys Ser Ser Asn Thr Ala Tyr
65                  70                  75                  80

Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys
                85                  90                  95

Ala Arg Gly His Ser Tyr Tyr Phe Tyr Asp Gly Asp Tyr Trp Gly Gln
            100                 105                 110

Gly Thr Ser Val Thr Val Ser Ser
        115                 120
```

<210> 80
<211> 115
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<400> 80

```
Val Gln Leu Gln Gln Ser Gly Ala Glu Leu Met Lys Pro Gly Ala Ser
1               5                   10                  15

Val Lys Ile Ser Cys Lys Ala Ser Gly Tyr Thr Phe Ser Asp Tyr Trp
            20                  25                  30

Ile Glu Trp Val Lys Gln Arg Pro Gly His Gly Leu Glu Trp Ile Gly
        35                  40                  45

Glu Ile Leu Pro Gly Ser Gly Ser Thr Asn Tyr His Glu Arg Phe Lys
    50                  55                  60

Gly Lys Ala Thr Phe Thr Ala Asp Thr Ser Ser Ser Thr Ala Tyr Met
65                  70                  75                  80

Gln Leu Asn Ser Leu Thr Ser Glu Asp Ser Gly Val Tyr Tyr Cys Leu
                85                  90                  95

His Gly Asn Tyr Asp Phe Asp Gly Trp Gly Gln Gly Thr Thr Leu Thr
            100                 105                 110

Val Ser Ser
```

<210> 81
<211> 121
<212> PRT
<213> Artificial Sequence

<220>
<223> synthetic antibody structure

<220>
<221> MISC_FEATURE
<222> (20)..(20)
<223> "X" may be any amino acid

<220>
<221> MISC_FEATURE
<222> (34)..(34)
<223> "X" may be any amino acid

<220>
<221> MISC_FEATURE
<222> (43)..(43)
<223> "X" may be any amino acid

<220>
<221> MISC_FEATURE
<222> (50)..(50)
<223> "X" may be any amino acid

<220>
<221> MISC_FEATURE
<222> (52)..(52)
<223> "X" may be any amino acid

<220>
<221> MISC_FEATURE
<222> (54)..(54)
<223> "X" may be any amino acid

<220>
<221> MISC_FEATURE
<222> (57)..(57)
<223> "X" may be any amino acid

<220>
<221> MISC_FEATURE
<222> (59)..(59)
<223> "X" may be any amino acid

<220>
<221> MISC_FEATURE
<222> (99)..(99)
<223> "X" may be any amino acid

<220>
<221> MISC_FEATURE
<222> (100)..(100)
<223> "X" may be any amino acid

<220>
<221> MISC_FEATURE
<222> (103)..(108)
<223> "X" may be any amino acid

<220>
<221> MISC_FEATURE
<222> (116)..(116)
<223> "X" may be any amino acid

<400> 81

Gln Val Gln Leu Gln Gln Ser Gly Ala Glu Leu Val Lys Pro Gly Ala
1 5 10 15

Ser Val Lys Xaa Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Ser Tyr
20 25 30

Trp Xaa His Trp Val Lys Gln Arg Pro Gly Xaa Gly Leu Glu Trp Ile
35 40 45

Gly Xaa Ile Xaa Pro Xaa Ser Gly Xaa Thr Xaa Tyr Asn Glu Lys Phe
50 55 60

Lys Gly Lys Ala Thr Leu Thr Val Asp Lys Ser Ser Ser Thr Ala Tyr
65 70 75 80

Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Val Tyr Cys
85 90 95

Ala Arg Xaa Xaa Tyr Tyr Xaa Xaa Xaa Xaa Xaa Xaa Asp Tyr Trp Gly
100 105 110

Gln Gly Thr Xaa Val Thr Val Ser Ser
115 120

<210> 82
<211> 113
<212> PRT
<213> Mus musculus

<400> 82

```
Asp Val Leu Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1               5                  10                  15

Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val His Ser
            20                  25                  30

Asn Val Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
        35                  40                  45

Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
    50                  55                  60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Arg Ile
65                  70                  75                  80

Ser Arg Val Glu Ala Glu Asp Leu Gly Ile Tyr Tyr Cys Phe Gln Gly
                85                  90                  95

Ser His Val Pro Pro Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
            100                 105                 110

Arg
```

<210> 83
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized EM164 antibody

<400> 83

```
Asp Val Val Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1               5                  10                  15

Asp Pro Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val His Ser
            20                  25                  30

Asn Val Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
        35                  40                  45

Pro Arg Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
```

50 55 60

Asp Arg Phe Ser Gly Ser Gly Ala Gly Thr Asp Phe Thr Leu Arg Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Leu Gly Ile Tyr Tyr Cys Phe Gln Gly
85 90 95

Ser His Val Pro Pro Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105 110

Arg

<210> 84
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized EM164 antibody

<400> 84

Asp Val Leu Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Pro Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val His Ser
20 25 30

Asn Val Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ala Gly Thr Asp Phe Thr Leu Arg Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Leu Gly Ile Tyr Tyr Cys Phe Gln Gly
85 90 95

Ser His Val Pro Pro Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105 110

Arg

<210> 85
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized EM164 antibody

<400> 85

Asp Val Leu Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Pro Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val His Ser
20 25 30

Asn Val Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Arg Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ala Gly Thr Asp Phe Thr Leu Arg Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Leu Gly Ile Tyr Tyr Cys Phe Gln Gly
85 90 95

Ser His Val Pro Pro Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105 110

Arg

<210> 86
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized EM164 antibody

<400> 86

```
Asp Val Val Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1               5                  10                  15

Asp Pro Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val His Ser
            20                  25                  30

Asn Val Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
        35                  40                  45

Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
    50                  55                  60

Asp Arg Phe Ser Gly Ser Gly Ala Gly Thr Asp Phe Thr Leu Arg Ile
65                  70                  75                  80

Ser Arg Val Glu Ala Glu Asp Leu Gly Ile Tyr Tyr Cys Phe Gln Gly
                85                  90                  95

Ser His Val Pro Pro Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
            100                 105                 110

Arg
```

<210> 87
<211> 123
<212> PRT
<213> Mus musculus

<400> 87

```
Gln Val Gln Leu Gln Gln Ser Gly Ala Glu Leu Val Lys Pro Gly Ala
1               5                  10                  15

Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Ser Tyr
            20                  25                  30

Trp Met His Trp Val Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile
        35                  40                  45

Gly Glu Ile Asn Pro Ser Asn Gly Arg Thr Asn Tyr Asn Glu Lys Phe
    50                  55                  60
```

```
Lys Arg Lys Ala Thr Leu Thr Val Asp Lys Ser Ser Ser Thr Ala Tyr
65                  70                  75                  80

Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Phe
                85                  90                  95

Ala Arg Gly Arg Pro Asp Tyr Tyr Gly Ser Ser Lys Trp Tyr Phe Asp
            100                 105                 110

Val Trp Gly Ala Gly Thr Thr Val Thr Val Ser
        115                 120
```

<210> 88
<211> 123
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized EM164 antibody

<400> 88

```
Gln Val Gln Leu Val Gln Ser Gly Ala Glu Val Val Lys Pro Gly Ala
1               5                   10                  15

Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Ser Tyr
            20                  25                  30

Trp Met His Trp Val Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile
        35                  40                  45

Gly Glu Ile Asn Pro Ser Asn Gly Arg Thr Asn Tyr Asn Gln Lys Phe
    50                  55                  60

Gln Gly Lys Ala Thr Leu Thr Val Asp Lys Ser Ser Ser Thr Ala Tyr
65                  70                  75                  80

Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Phe
                85                  90                  95

Ala Arg Gly Arg Pro Asp Tyr Tyr Gly Ser Ser Lys Trp Tyr Phe Asp
            100                 105                 110

Val Trp Gly Gln Gly Thr Thr Val Thr Val Ser
        115                 120
```

<210> 89
<211> 339
<212> DNA
<213> Artificial Sequence

<220>
<223> variable region of humanized EM164 antibody - light chain

<220>
<221> CDS
<222> (1)..(339)

<400> 89
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gat gtt gtg atg acc caa act cca ctc tcc ctg cct gtc agt ctt gga       48
Asp Val Val Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1               5                   10                  15

gat cca gcc tcc atc tct tgc aga tct agt cag agc ata gta cat agt       96
Asp Pro Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val His Ser
            20                  25                  30

aat gta aac acc tat tta gaa tgg tac ctg cag aaa cca ggc cag tct      144
Asn Val Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
        35                  40                  45

cca agg ctc ctg atc tac aaa gtt tcc aac cga ttt tct ggg gtc cca      192
Pro Arg Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
    50                  55                  60

gac agg ttc agt ggc agt gga gca ggg aca gat ttc aca ctc agg atc      240
Asp Arg Phe Ser Gly Ser Gly Ala Gly Thr Asp Phe Thr Leu Arg Ile
65                  70                  75                  80

agc aga gtg gag gct gag gat ctg gga att tat tac tgc ttt caa ggt      288
Ser Arg Val Glu Ala Glu Asp Leu Gly Ile Tyr Tyr Cys Phe Gln Gly
                85                  90                  95

tca cat gtt cct ccg acg ttc ggt gga ggc acc aaa ctg gaa atc aaa      336
Ser His Val Pro Pro Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
            100                 105                 110

cgt                                                                 339
Arg
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<210> 90
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> variable region of humanized EM164 antibody - light chain

<400> 90

Asp Val Val Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Pro Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val His Ser
20 25 30

Asn Val Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Arg Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ala Gly Thr Asp Phe Thr Leu Arg Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Leu Gly Ile Tyr Tyr Cys Phe Gln Gly
85 90 95

Ser His Val Pro Pro Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105 110

Arg

<210> 91
<211> 369
<212> DNA
<213> Artificial Sequence

<220>
<223> variable region of humanized EM164 antibody - heavy chain

<220>
<221> CDS
<222> (1)..(369)

<400> 91
cag gtc caa ctg gtg cag tct ggg gct gaa gtg gtg aag cct ggg gct 48
Gln Val Gln Leu Val Gln Ser Gly Ala Glu Val Val Lys Pro Gly Ala
1 5 10 15

tca gtg aag ctg tcc tgt aag gct tct ggc tac acc ttc acc agc tac 96
Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Ser Tyr
20 25 30

```
tgg atg cac tgg gtg aag cag agg cct gga caa ggc ctt gag tgg att      144
Trp Met His Trp Val Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile
        35                  40                  45

gga gag att aat cct agc aac ggt cgt act aac tac aat cag aag ttc      192
Gly Glu Ile Asn Pro Ser Asn Gly Arg Thr Asn Tyr Asn Gln Lys Phe
    50                  55                  60

cag ggg aag gcc aca ctg act gta gac aaa tcc tcc agc aca gcc tac      240
Gln Gly Lys Ala Thr Leu Thr Val Asp Lys Ser Ser Ser Thr Ala Tyr
65                  70                  75                  80

atg caa ctc agc agc ctg aca tct gag gac tct gcg gtc tat tac ttt      288
Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Phe
                85                  90                  95

gca aga gga aga cca gat tac tac ggt agt agc aag tgg tac ttc gat      336
Ala Arg Gly Arg Pro Asp Tyr Tyr Gly Ser Ser Lys Trp Tyr Phe Asp
            100                 105                 110

gtc tgg ggc caa ggg acc acg gtc acc gtc tcc                         369
Val Trp Gly Gln Gly Thr Thr Val Thr Val Ser
        115                 120
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<210> 92
<211> 123
<212> PRT
<213> Artificial Sequence

<220>
<223> variable region of humanized EM164 antibody - heavy chain

<400> 92

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Gln Val Gln Leu Val Gln Ser Gly Ala Glu Val Val Lys Pro Gly Ala
1               5                   10                  15

Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Ser Tyr
            20                  25                  30

Trp Met His Trp Val Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile
        35                  40                  45

Gly Glu Ile Asn Pro Ser Asn Gly Arg Thr Asn Tyr Asn Gln Lys Phe
    50                  55                  60

Gln Gly Lys Ala Thr Leu Thr Val Asp Lys Ser Ser Ser Thr Ala Tyr
65                  70                  75                  80
```

```
Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Phe
                85                  90                  95

Ala Arg Gly Arg Pro Asp Tyr Tyr Gly Ser Ser Lys Trp Tyr Phe Asp
            100                 105                 110

Val Trp Gly Gln Gly Thr Thr Val Thr Val Ser
        115                 120
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<210> 93
<211> 339
<212> DNA
<213> Artificial Sequence

<220>
<223> light chain variable region of humanized EM164 v1.1 antibody

<220>
<221> CDS
<222> (1)..(339)

<400> 93

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Asp Val Leu Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1               5                   10                  15

gat cca gcc tcc atc tct tgc aga tct agt cag agc ata gta cat agt       96
Asp Pro Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val His Ser
            20                  25                  30

aat gta aac acc tat tta gaa tgg tac ctg cag aaa cca ggc cag tct      144
Asn Val Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
        35                  40                  45

cca aag ctc ctg atc tac aaa gtt tcc aac cga ttt tct ggg gtc cca      192
Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
    50                  55                  60

gac agg ttc agt ggc agt gga gca ggg aca gat ttc aca ctc agg atc      240
Asp Arg Phe Ser Gly Ser Gly Ala Gly Thr Asp Phe Thr Leu Arg Ile
65                  70                  75                  80

agc aga gtg gag gct gag gat ctg gga att tat tac tgc ttt caa ggt      288
Ser Arg Val Glu Ala Glu Asp Leu Gly Ile Tyr Tyr Cys Phe Gln Gly
                85                  90                  95

tca cat gtt cct ccg acg ttc ggt gga ggc acc aaa ctg gaa atc aaa      336
Ser His Val Pro Pro Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
            100                 105                 110

cgt                                                                 339
Arg
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<210> 94
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> light chain variable region of humanized EM164 v1.1 antibody

<400> 94

Asp Val Leu Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Pro Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Ile Val His Ser
20 25 30

Asn Val Asn Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Lys Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ala Gly Thr Asp Phe Thr Leu Arg Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Leu Gly Ile Tyr Tyr Cys Phe Gln Gly
85 90 95

Ser His Val Pro Pro Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105 110

Arg

<210> 95
<211> 339
<212> DNA
<213> Artificial Sequence

<220>
<223> light chain variable region of humanized EM164 v1.2 antibody

<400> 95
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atctcttgca gatctagtca gagcatagta catagtaatg taaacaccta tttagaatgg 120

tacctgcaga aaccaggcca gtctccaagg ctcctgatct acaaagtttc caaccgattt 180

tctggggtcc cagacaggtt cagtggcagt ggagcaggga cagatttcac actcaggatc 240

agcagagtgg aggctgagga tctgggaatt tattactgct ttcaaggttc acatgttcct 300

ccgacgttcg gtggaggcac caaactggaa atcaaacgt 339

<210> 96
<211> 339
<212> DNA
<213> Artificial Sequence

<220>
<223> light chain variable region of humanized EM164 v1.3 antibody

<400> 96
gatgttgtga tgacccaaac tccactctcc ctgcctgtca gtcttggaga tccagcctcc 60

atctcttgca gatctagtca gagcatagta catagtaatg taaacaccta tttagaatgg 120

tacctgcaga aaccaggcca gtctccaaag ctcctgatct acaaagtttc caaccgattt 180

tctggggtcc cagacaggtt cagtggcagt ggagcaggga cagatttcac actcaggatc 240

agcagagtgg aggctgagga tctgggaatt tattactgct ttcaaggttc acatgttcct 300

ccgacgttcg gtggaggcac caaactggaa atcaaacgt 339